

Current Smokers' Preferences for Receiving Cessation
Information in a Lung Cancer Screening Setting

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ABSTRACT

Objective: To identify current smokers' communication format preferences for receiving smoking cessation information in a lung cancer screening setting.

Methods: Cross-sectional correlational design using survey methodology with 159 screening-eligible current smokers. Data was dichotomized (digital versus traditional preference) and analyzed using Pearson's chi-squared test, Mann-Whitney U test, and logistic regression.

Results: Race was a statistically significant predictor with White participants having four times greater odds of reporting preference for a digital format for receiving smoking cessation information such as social media and/or supportive text messages (OR: 4.06; $p = 0.004$).

Conclusions: Lung cancer screening is a new venue where current long-term smokers can be offered information about smoking cessation while they are engaging in a health promoting behavior and potentially more likely to contemplate quitting. It is important to consider the communication format preference of current smokers to support cessation uptake.

Practice Implications: The study is the first to examine communication format preference of current smokers in the context of the lung cancer screening venue. Key differences noted by race support the need for further research examining multiple formats of communication with efforts to maximize options in the cancer screening setting.

Introduction

Despite a steady decline in smoking rates among the general population over the past five decades, the health, social, and economic burden of tobacco smoking remains immense [1]. Approximately 17 percent of U.S. adults still smoke [2], and an estimated one-half million adults will die due to tobacco-related diseases [3]. Tobacco smoking is the greatest risk factor for lung cancer and long-term smokers are at greatest risk for its development [3]. Lung cancer kills more people worldwide than any other cancer, regardless of gender or ethnicity [3]. Until recently, there was not an effective method to screen for lung cancer in high-risk individuals. However, in response to empirical findings from the National Lung Screening Trial, the U.S. Preventive Services Task Force (USPSTF) issued a Grade B recommendation in 2013 for annual low-dose computed tomography (LDCT) of the chest to screen for lung cancer in high-risk individuals [4, 5]. People are eligible for lung cancer screening if they are: 1) aged 55 to 77 years; 2) current smokers or former smokers who have quit within the past 15 years; and 3) have a long-term history of tobacco smoking (equivalent to 30 pack-years or greater) [4]. Approximately 10 million adults are eligible for lung cancer screening in the U.S. and an estimated 40% of those are current smokers [6, 7].

Individuals engaging in the behavior of early detection through cancer screening may be more receptive to exploring options for smoking cessation. Therefore, lung cancer screening offers a new and unique venue to offer smoking cessation interventions to current smokers and may serve as a potentially teachable moment for health behavior change. This setting provides an additional healthcare encounter with a clinician outside of wellness and acute care visits to assess for stage of readiness for smoking cessation and intervention, if appropriate. All major medical and professional organizations such as the American Cancer Society [8], National Comprehensive Cancer Network [9], American College of Chest Physicians [10], American Association for Thoracic Surgery [11], and the International Association for the Study of Lung Cancer [12] support the inclusion of smoking cessation interventions within the context of lung

cancer screening. This is consistent with the 2008 Update of the U.S. Public Health Services' Clinical Practice Guideline for Treating Tobacco Use and Dependence that all clinicians consistently ask, advise, and assist every tobacco user across treatment settings [13]. Further, the recent clinical guideline from the Association for the Treatment of Tobacco Use and Dependence and the Society for Research on Nicotine and Tobacco recommends that all smokers who present for lung cancer screening be encouraged to quit regardless of the screening results and the lung cancer screening setting offers a new venue for a healthcare provider to intervene as well as an opportunity for other clinicians (such as nurse practitioners, nurse navigators, radiologists, etc) to solidify the message of cessation [14]. However, there is a dearth of evidence supporting how to effectively implement or tailor smoking cessation services in this new touchpoint within the healthcare system to reach current smokers [14].

As a directive in the USPSTF lung cancer screening guidelines, smoking cessation services are a required component of lung cancer screening programs for current smokers [4]. Important mandates from Medicare further highlight the importance of assisting current smokers to stop smoking while receiving screening services. Current smokers must receive at a minimum brief cessation counseling combined with information about smoking cessation services for the screening LDCT scan to be reimbursed [15]. Medicare also requires that each patient be offered smoking cessation information and intervention, if desired, at radiology imaging centers where lung cancer screening is performed. There are multiple ways to provide information about evidence-based smoking cessation interventions including printed material, referral to a telephone quit line, web-based cessation support interventions, and face-to-face counseling. However, we do not know what communication format of smoking cessation information patients will prefer in this new setting. Therefore, the purpose of this study was to identify current smokers' communication format preferences for receiving smoking cessation information in a lung cancer screening setting and to determine any differences by sociodemographic variables.

Methods

Data Source

Data for this study are a subset drawn from a larger descriptive, cross-sectional study to psychometrically test four new scales to measure individual health beliefs about lung cancer screening [16]. The results reported here are a secondary data analysis of an item from the larger survey study presented to current smokers.

Sample and Data Collection

Investigators recruited lung cancer screening-eligible men and women aged 55 to 77 years who were current or former smokers with a 30 pack-year or greater tobacco smoking history. For individuals in the larger study who indicated they were current smokers, an additional item to assess communication format preference for smoking cessation information in the setting of lung cancer screening was presented.

Recruitment Procedures

Investigators obtained a convenience community-based sample using multiple recruitment methods including a national Facebook targeted advertisement recruitment campaign and traditional recruitment methods (i.e., in-person recruitment, recruitment flyers in high-traffic areas, and newspaper advertisement) [17]. The institutional review board at Indiana University approved the study prior to recruitment.

Data Collection

For all recruitment methods, data was collected via a web-based survey using the secure web-based platform, REDCap (Research Electronic Data Capture) system. For participants recruited using in-person methods, online access was provided via a laptop computer for completion of the survey.

Measures

Communication format preference for smoking cessation information was assessed with one item that was embedded within the larger survey to measure individual health beliefs about

lung cancer screening. Participants who indicated they were a current smoker were asked to respond to the following question: If you got a lung scan and were offered help to stop smoking at your lung scan, which type of activity to help quit smoking would you be more likely to try: (1) face-to-face counseling?; (2) telephone counseling with your healthcare provider?; (3) printed brochure?; (4) referral to a telephone quit line to help stop smoking?; (5) using social media like Facebook as a support to stop smoking?; (6) referral to an Internet or web-based program?; or (7) receiving supportive text messages about quitting?

Data Analyses

The data was dichotomized to conceptually reflect the type of communication format preference for smoking cessation information: (1) traditional support preference (reflected methods of smoking cessation intervention such as face-to-face counseling, telephone counseling, printed brochure, and/or referral to a telephone quit line to support smoking cessation efforts); and (2) digital support preference (reflected methods using social media, Internet or web-based programs, and/or receiving supportive text messages to support smoking cessation efforts). Description of the categorical characteristics of the study participants was based on the calculation of absolute (N) and relative frequencies (%). Median and interquartile ranges (IQR) were calculated for age. Comparison between the categorical characteristics and digital support preference was based on Pearson's chi-squared test while comparison of the age distribution between the two preferences (traditional versus digital support) was based on the non-parametric Mann-Whitney U test. In order to identify predictors of preference for digital support, while adjusting for the potential confounding effects of other characteristics, we performed logistic regression. Backwards-stepwise variable selection was performed to select the independent variables of the final multivariable model, with cutoff p -values of < 0.05 and > 0.1 for entry and for removal from the model, respectively. Age and gender were included in the model regardless of the level of significance. The statistical analysis was performed using the statistical software Stata 14 for Windows.

Results

In total, 159 individuals aged 55 to 77 years were included in the study sample. Participants median (IQR) age was 59 (57, 64) years. Most were White (74.1%), female (62%) and had completed some college education (70.4%). Only a small portion of participants had a total annual income of \$50,000 or greater (18.4%). In addition, 21.7% of the participants had a family history of lung cancer. The proportion of preference for digital support was higher among White participants (41.0%) compared to Black participants (14.6%). Complete sociodemographic characteristics are presented in Table 1.

Univariable and multivariable analyses were performed and are presented in Table 2. The only statistically significant predictor from the univariable analysis was race, with White participants having four times greater odds of reporting preference for digital support for smoking cessation information such as via social media, Internet or web-based programs, and/or supportive text messages (OR: 4.06; $p = 0.004$). Race was also a significant predictor even after adjusting for age and gender (multivariable analysis results), with the OR being similar to the univariable analysis (OR: 4.18; $p = 0.004$). Additionally, age approached significance in the multivariable analysis, with older people tending to have less preference for digital formats, but this result was ultimately not significant ($p = 0.06$).

Discussion

Smoking Cessation Information Preferences in the Lung Cancer Screening Setting

Lung cancer screening offers a new and unique setting for patients at high-risk for the development of lung cancer to receive smoking cessation information. This venue offers a potentially teachable moment for health behavior change related to tobacco smoking for long-term smokers who may be thinking about risks related to their tobacco use. There are various communication formats for providing information about evidence-based smoking cessation interventions including: 1) digital communication formats such as text message [18, 19]; Internet-based [20, 21]; and social media platforms [22, 23]; and 2) traditional communication

formats such as telephone-based support [24], and face-to-face counseling [25]. As lung cancer screening programs are more widely implemented and refined, it is critical to understand patients' communication format preferences for smoking cessation information. In order to maximize the likelihood of smoking cessation, offering the patient a choice in communication format for how they receive support to quit smoking has value. It is critical that clinicians have access to toolkits that are designed to meet the needs of a wide range of patient preferences. Therefore, understanding differences in communication format preferences for smoking cessation support is an important consideration. Tailored information is effective in health behavior change efforts because people pay more attention to health information that is personally relevant, and in a format that they desire [26]. Tailoring smoking cessation information to the communication format preference of the individual may have a positive impact on quit rates because individuals are more likely to engage with the support components that comprise the preferred smoking cessation intervention. Our study's findings support differences in communication format preference by race.

To our knowledge, this is the first study to examine preferences for the communication format of smoking cessation information in the context of lung cancer screening and offers an initial glimpse into the importance of communication format preference as a component to assess as healthcare systems decide how to deliver smoking cessation services within this new venue. Studies have assessed the implementation of smoking cessation interventions in lung cancer screening and support this setting as a potentially teachable moment for intervention [27-29]. Furthermore, this study extends the findings of Sampson et al. [30] examining the preferences for the provision of smoking cessation education among cancer patients by examining the screening phase of the cancer care continuum as an additional opportunity with a patient on which to intervene. Findings also extend initial feasibility of smoking cessation interventions in a lung cancer screening setting by supporting potential differences by race of current smokers and their communication format preferences. This stimulates new questions on

how best to address communication preference in tailoring smoking cessation information using the array of evidence-based tobacco treatment options.

Strength and Limitations

Study results offer initial insight into communication format preference of smoking cessation information among lung cancer screening-eligible current smokers. This supports the need for future comprehensive research in this area as well as the potential to tailor smoking cessation interventions by communication preference in this new venue for cancer screening as options are being offered and considered by patients. As with all studies, results should be interpreted in the context of the study's limitations. Dichotomization of the dependent variable may have presented limitations to interpretation. While dichotomizing the dependent variable to digital versus traditional support communication format preference identified key differences by race, future studies should explore specific types of digital and traditional communication format preference for smoking cessation interventions more robustly. In addition, sample size may have limited statistical analysis by both age and each of the seven choices for communication format preference for smoking cessation intervention. Although our sample size was adequate to reveal statistical differences by race, future studies with a larger sample size are needed in order to statistically test differences by age and other sociodemographic variables. Furthermore, although we did carefully consider potential confounders in our analysis (i.e., age, gender, race, education, income, family history of lung cancer), it is possible that we may not have considered all possible confounders. As the science advances in this area and future studies examine communication format preference in the context of lung cancer screening, potential confounders should be considered. Finally, while the sample characteristics were skewed towards a younger sample of White, educated females, this is similar to the demographic characteristics of the current smokers in other lung cancer screening studies [31-33].

Conclusions

Lung cancer screening offers a new venue where current long-term smokers are engaging in a health promoting behavior and thus, may be contemplating smoking cessation. With the range of smoking cessation interventions that have been developed, tested and supported as effective, it is important to consider which interventions may be most successful in the lung cancer screening venue. One important component of smoking cessation interventions is the communication format used for the information. Proven methods of smoking cessation interventions have been developed and are delivered through Internet, text messaging, telephone, face-to-face, and via print. Clinicians' knowledge of patient preferences for receiving information in the context of a lung cancer screening setting is essential for fostering successful smoking cessation.

As the science moves forward, healthcare systems and clinicians have a new opportunity to intervene with a high-risk population to address the burden of tobacco use in the lung cancer screening setting. Leveraging communication format preference for smoking cessation information in this new setting has the potential to increase patient engagement with evidence-based interventions and may positively impact smoking cessation rates. Future research is needed to examine the potential implications for dissemination and implementation of evidence-based smoking cessation interventions using different communication formats to determine both improvement in patient-level outcomes as well as practice implications at the healthcare system level.

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Table 1. Sociodemographic Characteristics of Participants by Communication Format Preference.

	Preference for Digital Support		Overall	p-value
	No N (%)	Yes N (%)	N (%)	
Gender				0.12
Male	35 (58.3)	25 (41.7)	60 (38.0)	
Female	69 (70.4)	29 (29.6)	98 (62.0)	
Race				0.002
Black	35 (85.4)	6 (14.6)	41 (25.9)	
White	69 (59.0)	48 (41.0)	117 (74.1)	
Education				0.343
Up to high school	35 (74.5)	12 (25.5)	47 (29.6)	
Some college	44 (62.0)	27 (38.0)	71 (44.7)	
College graduate or higher	26 (63.4)	15 (36.6)	41 (25.8)	
Total annual household income				0.589
<\$25,000	41 (69.5)	18 (30.5)	59 (37.3)	
\$25,000-\$50,000	47 (67.1)	23 (32.9)	70 (44.3)	
>\$50,000	17 (58.6)	12 (41.4)	29 (18.4)	
Family history of lung cancer				0.132
No	77 (62.6)	46 (37.4)	123 (78.3)	
Yes	26 (76.5)	8 (23.5)	34 (21.7)	
	Median (IQR)	Median (IQR)	Median (IQR)	p-value
Age (years)	60.0 (57.0, 64.0)	59.0 (57.0, 63.0)	59.0 (57.0, 64.0)	0.218

Table 2. Univariable and multivariable analysis of preference for digital support.

	<u>Univariable</u>			<u>Multivariable</u>		
	OR	95% CI	p-value	OR	95% CI	p-value
Age						
per 10 years	0.553	(0.254, 1.205)	0.136	0.442	(0.192, 1.018)	0.055
Gender						
Male	1			1		
Female	0.588	(0.300, 1.152)	0.122	0.629	(0.305, 1.298)	0.210
Race						
Black/Other	1			1		
White	4.058	(1.583, 10.400)	0.004	4.183	(1.597, 10.958)	0.004
Education			0.348	NS		
Up to high school	1					
Some college	1.790	(0.795, 4.032)	0.160			
College graduate or higher	1.683	(0.675, 4.193)	0.264			
Total annual household income			0.592	NS		
<\$25,000	1					
\$25,000-\$50,000	1.115	(0.529, 2.349)	0.775			
>\$50,000	1.608	(0.638, 4.050)	0.314			
Family history of lung cancer				NS		
No	1					
Yes	0.515	(0.215, 1.233)	0.136			

CI = Confidence Interval; OR = Odds Ratio; NS = Non-significant

Results from logistic regression analysis. Multivariable analysis model was constructed based on a stepwise selection algorithm with $p = 0.05$ and $p = 0.10$ as criteria for entry and exclusion in the model. Gender was included in the model regardless of the level of significance.